

SEBEKIA OXYCEPHALA (PENTASTOMIDA) FROM  
FLORIDA FISHES AND SOME NOTES ON  
THE MORPHOLOGY OF THE LARVAE

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and

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*Sebekia oxycephala* (Diesing) Sambon, 1922, lives in the lungs, trachea, and pharynx of crocodiles and alligators which inhabit South America and the southern portion of North America. Developmental stages have been reported (Heymons, 1935) from fishes, snakes, a lizard, and crocodiles. The genus *Sebekia* contains six additional species, all of which are parasitic in alligators and crocodiles. *S. oxycephala* is not very well known and there is less information on the other species.

In 1928 Holl created a new genus and a new species for linguatulids from *Eupomotis gibbosus* (L.) and *Ameiurus natalis* (Le Sueur) taken from an artificial lake near Gibsonville, North Carolina. He called his specimens *Bdukus ichthyius*. Heymons believes that Holl's species is the larval form of *Sebekia oxycephala*.

Bangham (1939) studied the parasites of fish, particularly the sunfish family Centrarchidae, collected near Englewood, Florida. Larval linguatulids, which resembled *Bdukus ichthyius*, were found. They were different, however, in the distribution of the stigmata and Doctor Holl very kindly loaned us two specimens of *B. ichthyius* for comparative studies.

The internal anatomy of *Sebekia oxycephala* is very imperfectly known. Heymon's illustration of a larva deals with external features; his illustration of the anterior portion of an adult male supplies information on the sexual organs. The material collected by Bangham furnishes additions to our knowledge of the anatomy, geographical distribution, and hosts of *Sebekia oxycephala*.

ANATOMICAL STUDY

Thirty-one parasites were collected and preserved in five per cent formalin. Some were killed in their cysts and others were dissected out of them. The specimens were stained in Delafield's haematoxylin and mounted in balsam on slides. The stain entered through the mouth and anus to some extent, but a few specimens had been injured and the

chitinous covering was not intact. The internal organs in such individuals were favorably colored for observation.

Within its cyst the larva assumes a characteristic attitude. The entire body is ventrally flexed and the abdominal portion is coiled underneath the head (Fig. 3). Young individuals show no evidence of segmentation and the head is large in proportion to the remainder of the body. The hooks and internal organs are incompletely developed. The cysts are 2.6 mm. in diameter and white in color. They were found at the surface of the liver under the peritoneum and in the mesenteries.

Completely developed encysted individuals, when removed from their coverings, are 3 mm. to 5.5 mm. in length and 0.4 mm. to 0.79 mm. in greatest width. In general, males are smaller than females. The total number of segments is from 64 to 68. The musculature of the body wall and hooks is functional and the shape of the body and position of the hooks show some variation in the different specimens. The widest part of the body is at the middle and it gradually diminishes in diameter toward the posterior end which is blunt. The terminal segment is of the same length as an individual segment anterior to it, and bears the anus at its tip. Towards the head the diameter becomes less but there is no definite neck. The first annulus is a very short distance posterior to the mouth.

The head bears the four hooks and mouth as conspicuous structures (Figs. 1 and 4). The hooks may be extended or retracted. They are similar in size and shape (Fig. 8).

The stigmata are found on all segments and the head. They are particularly evident in cuticula which has become loosened from the underlying tissues. The stigmata do not occur in definite rows as described and illustrated by Holl (1928) and Heymons (1935) for the specimens they studied. Their arrangement is irregular (Fig. 7) and there is no definite pattern. This irregularity is greater in younger than in older specimens and is easier to see in relaxed than in contracted individuals.

The intestine and lateral glands are similar in both sexes. The stomadaeum is quite short, extending below the mouth a distance equivalent to one segment. The proctodaeum is much longer and is found

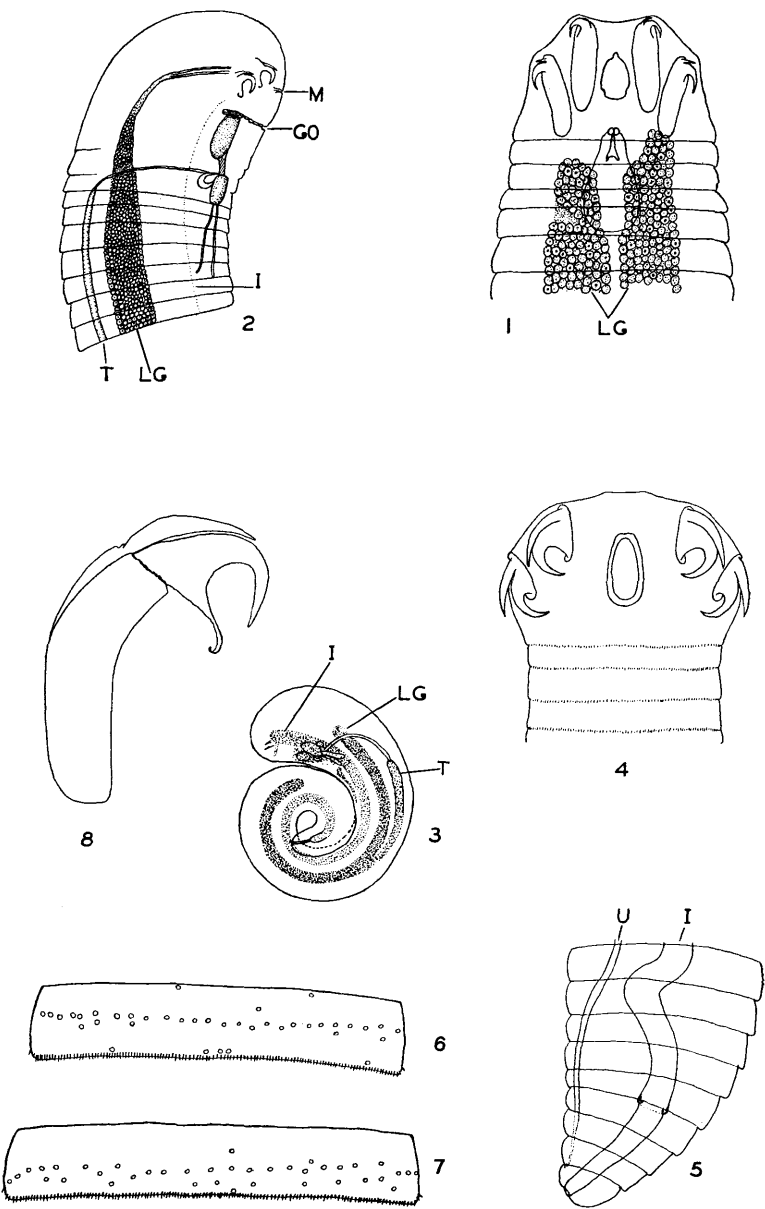
#### EXPLANATION OF PLATE

- Fig. 1. Head end of a well cleared male, ventral view.
- Fig. 2. Anterior end of male, lateral view.
- Fig. 3. Encysted male.
- Fig. 4. Head end of female, ventral view. The hooks are well extended and no internal morphology is visible. Figures 1, 4 and 5 are drawn at the same magnification.
- Fig. 5. Posterior end of a female, lateral view.
- Fig. 6. Segment from Holl's specimen number 940, showing distribution of the stigmata.
- Fig. 7. Segment from a Florida specimen.
- Fig. 8. Lateral view of a hook.

#### ABBREVIATIONS:

GO—Genital opening.  
I—Intestine.  
LG—Lateral gland.

M—Mouth.  
T—Testis.  
U—Uterus.



in the last four segments. The mid-intestine is of fairly uniform diameter although largest a short distance below the mouth. It pursues a rather winding path through the body. The pair of lateral glands extends, one on each side of the body, from the first segment to the fiftieth or fifty-fifth. The glands are voluminous and their cells are large. Two ducts emerge from the glands at their anterior ends and bend towards the bases of the hooks.

The sexual organs of the male (Fig. 2) are distinct but the individual structures are not named since the connections between them cannot be determined with certainty. The organs, in an earlier stage of development where they appear quite different in shape and arrangement, are evident in a young encysted specimen (Fig. 3).

The sexual organs of the female cannot be seen except for a dorsally placed ovary and a ventral vagina. The sexual opening appears to be on the last segment and anterior to the anus (Fig. 5).

#### HOSTS

Eighteen fish were infected with one to six linguatulids which were usually encysted in the mesenteries. The species of fish and the numbers of each that were infected are:

- 1 Bowfin, *Amia calva* Linn.;
- 1 Mosquito-fish, *Gambusia affinis holbrookii* (Girard);
- 2 Black-spotted sunfish, *Sclerotis punctatus punctatus* (Valenciennes);
- 1 Florida long-eared sunfish, *Xenotis megalotis marginatus* (Holbrook);
- 6 Stump-knocker, *Eupomotis microlophus* (Günther);
- 5 Warmouth bass, *Chaenobryttus gulosus* (Cuvier and Valenciennes);
- 2 Black crappie, *Pomoxis sparoides* (Lacépède).

The total numbers of these fish examined are, in the order given above, 21, 143, 18, 14, 49, 90, and 79. The infected fish were obtained from small pools and ponds near the channels of large streams. Fish were also taken from the Myakka and Peace Rivers, Lake Okeechobee and Everglades Canals but none of them carried this parasite.

Species of fish in which linguatulids were not found and the numbers of each examined are:

- Lepisosteus platyrhincus* De Kay, 82;  
*Dorosoma cepedianum* (LeSueur), 7;  
*Erimyzon sucetta sucetta* (Lacépède), 70;  
*Opsopoeodus emiliae* Hay, 25;  
*Notemigonus crysoleucas boscii* Valenciennes, 43;  
*Ictalurus lacustris punctatus* (Raf.), 13;  
*Ictalurus catus* (Linn.), 8;  
*Ameiurus natalis* (LeSueur), 45;  
*Ameiurus nebulosus marmoratus* (Holbrook), 22;  
*Schilbeodes gyrinus* (Mitchill), 1;  
*Esox niger* LeSueur, 10;

*Fundulus grandis* Baird and Girard, 8;  
*Fundulus majalis* (Walbaum), 10;  
*Fundulus similis* (Baird and Girard), 24;  
*Fundulus notatus* (Raf.), 2;  
*Fundulus chrysotus* (Günther), 84;  
*Fundulus cingulatus* (Cuvier and Valenciennes), 16;  
*Fundulus seminolis* Girard, 14;  
*Floridichthys carpio carpio* (Günther), 3;  
*Jordanella floridae* Goode and Bean, 70;  
*Cyprinodon variegatus variegatus* Lacépède, 6;  
*Heterandria formosa* Agassiz, 21;  
*Mollienesis latipinna* LeSueur, 93;  
*Trinectes maculatus* (Raf.), 4;  
*Menidia beryllina atrimentis* Kendall, 10;  
*Labidesthes sicculus vanhyningi* Bean and Reid, 17;  
*Mugil cephalus* Linn., 6;  
*Huro salmoides* (Lacépède); 86;  
*Helioperca macrochira* (Raf.), 104;  
*Enneacanthus gloriosus* (Holbrook), 12;  
*Elassoma evergladei* Jordan, 1;  
*Centropomus undecimalis* (Bloch), 4;  
*Eucinostomus gula* (Cuvier and Valenciennes), 13;  
*Dormitator maculatus* (Bloch), 14;

These fish were identified with the aid of the key to the fresh-water fishes of Florida by Carr (1936).

Due to the fact that *Sebekia oxycephala* has been found in many hosts, the absence of this parasite from the species of fish listed above would probably indicate lack of opportunity of becoming infected rather than resistance to infection.

#### DISCUSSION

A comparison of the specimens from Florida with specimens of *Bdulus ichthyus* leaves no doubt that they are identical. They agree in all details, but since the distribution of the stigmata is not the same as the published account for *B. ichthyus*, comment on this discrepancy is necessary. The stigmata of *B. ichthyus*, in general, form a circle around each segment as Holl has described. However, they also occur over the entire surface of most segments. This fact is indicated in Figure 6 which is drawn from one of Dr. Holl's specimens. Segments which are contracted show a fairly even row of openings. This is due to the fact that those openings near the middle of the segment remain open whereas the others are either closed or otherwise obscured from view.

Heymon's illustration of the larva of *Sebekia oxycephala* creates the impression that the stigmata on each segment occur in a single row, but close inspection reveals that these rows are very irregular and approach the condition described above.

There is no doubt that the larva which Heymons calls *S. oxycephala* is identical with *Bdukus ichthyius*. If these linguatulids actually are larvae of *S. oxycephala*, then *B. ichthyius* becomes a synonym since the adult was named first. The identity of these larvae as *Sebekia oxycephala* is suggested by the structural similarity between the larvae and the adults and a correspondence in their geographic distribution. The specimens from Florida fishes yield considerable information to support this contention.

#### SUMMARY

Linguatulid larvae, identical with *Bdukus ichthyius* Holl, 1928, and secured from Florida fishes, have been studied. Heymon's opinion that *B. ichthyius* is the larval form of *Sebekia oxycephala* (Diesing) Sambon, 1922, is supported. Comments are made on the morphology and ecology of this species, including the reporting of seven new fish hosts.

#### REFERENCES

- Bangham, R. V. 1939. Parasites of Centrarchidae from Southern Florida. Trans. Am. Fish. Soc., 68: 263-268.  
Carr, A. F., Jr. 1936. A key to the fresh-water fishes of Florida. Proc. Fla. Acad. of Sci., 1: 72-86.  
Heymons, R. 1935. Pentastomida. Bronn's Klassen und Ordnungen des Tierreichs. 5 Band, 4 Abteilung, 1 Buch.  
Holl, F. J. 1928. A linguatulid parasite from North American fishes. Journ. Parasitol., 15: 63-66.
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